

Subject: The abstract for the conference on Planetary Protection

## CLASS V COMPLIANT CONTAINER FOR THE MARS SAMPLE RETURN MISSION

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A novel containerization technique that satisfies Planetary Protection Class V requirements has been developed and demonstrated on the mock-up of the Mars Sample Return Container. The technology produces a container that is free from Martian contaminants on an atomic level. The containerization technique can be used on any celestial body that may support life. A major advantage of the proposed technology is the possibility of very fast (less than an hour) verification of both containment and cleanliness with typical metallurgical laboratory equipment. No separate biological verification is required. In addition to Class V requirements, the proposed container presents a surface that is clean from any, even non-viable organisms, and any molecular fragments of biological origin that are unique to Mars or any other celestial body other than Earth.

Double wall container, explosive welding with a sacrificial layer, and cut-through-the-seam techniques have been used to create a Class V compliant container. The joining process is accomplished by an explosively driven, high velocity, angular collision of the metal, which melts and effaces the sacrificial layer from the surfaces to allow valence electron sharing to bond the interface. The sacrificial layer guarantees that the created seam is Class V clean. The energy of the same explosion is used to cut the inner and the outer containers apart. Separating the double wall container through the seam creates an object with the outside surface that is Class V clean on a molecular level.